Amendments to the Claims

Please cancel Claims 43, 44, 48, 59-64 and 66. Please amend Claims 40 and 65. Please add new Claims 67-88. The Claim Listing below will replace all prior versions of the claims in the application:

Claim Listing

1.-39. (Canceled)

40. (Currently Amended) A patient-specific apparatus ~~Apparatus~~ for use in tissue engineering, wherein said apparatus ~~comprising:~~ comprises a scaffold structure corresponding to a digital model of the patient-specific apparatus, said scaffold structure comprising:

a plurality of horizontal layers of scaffold material, wherein each horizontal layer is sequentially adhered to the adjacent layer,
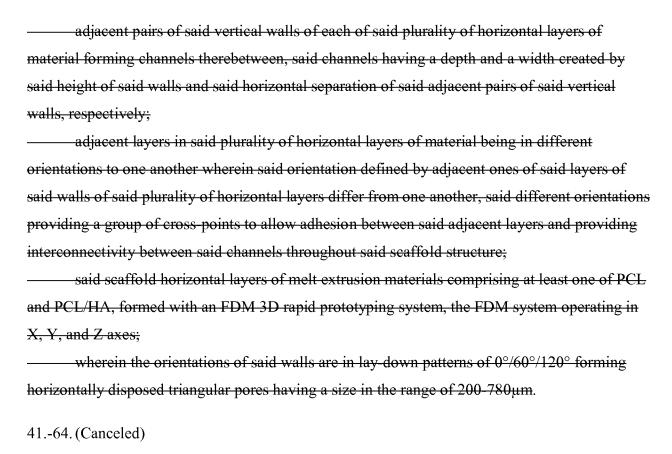
wherein each horizontal layer comprises a plurality of raster roads of melt extrusion filament material selected from polycaprolactone (PCL), a polycaprolactone/hydroxyapatite (PCL/HA) composite, or a polycaprolactone/tricalcium phosphate (PCL/TCP) composite with a fill gap between each raster road, thereby providing a horizontal channel between each raster road,

wherein the ratio of the raster road width to the channel width is constant in each layer,

and wherein the each sequential layer is deposited at different raster angles in the z-axis view,

thereby providing a scaffold structure having interconnected channels, said scaffold structure is a patient-specific scaffold for use in tissue engineering ~~having a porosity of 30%-80% and formed of a plurality of horizontal layers of melt-extrusion filament materials formed at a liquefier temperature of 120° C ± 10° C and an envelope temperature of 25° C ± 2° C;~~

~~vertical walls forming each of said plurality of horizontal layers of material, said walls of each layer of said plurality of horizontal layers each having a height, each being horizontally separated from one another, and defining an orientation;~~
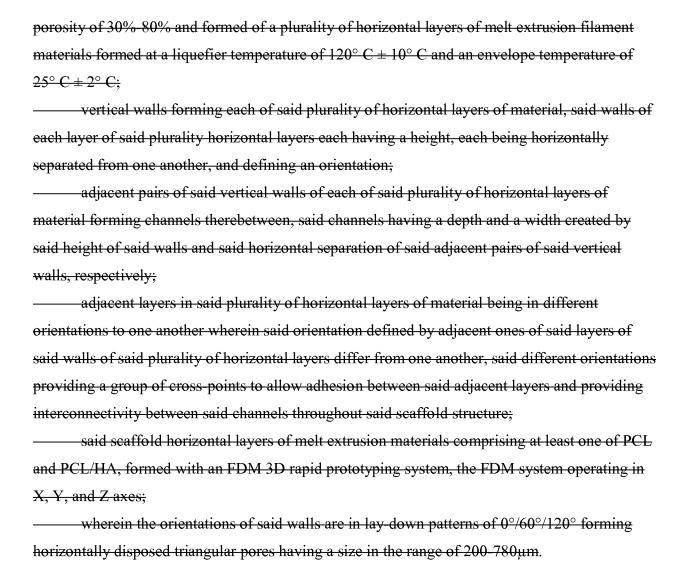
~~adjacent pairs of said vertical walls of each of said plurality of horizontal layers of material forming channels therebetween, said channels having a depth and a width created by said height of said walls and said horizontal separation of said adjacent pairs of said vertical walls, respectively;~~

~~adjacent layers in said plurality of horizontal layers of material being in different orientations to one another wherein said orientation defined by adjacent ones of said layers of said walls of said plurality of horizontal layers differ from one another, said different orientations providing a group of cross-points to allow adhesion between said adjacent layers and providing interconnectivity between said channels throughout said scaffold structure;~~

~~said scaffold horizontal layers of melt extrusion materials comprising at least one of PCL and PCL/HA, formed with an FDM 3D rapid prototyping system, the FDM system operating in X, Y, and Z axes;~~

~~wherein the orientations of said walls are in lay-down patterns of 0°/60°/120° forming horizontally disposed triangular pores having a size in the range of 200-780μm.~~

41.-64. (Canceled)

65.   (Currently Amended) <u>A patient-specific apparatus</u> ~~Apparatus~~ for use in tissue engineering, <u>wherein</u> said apparatus <u>consists of</u> ~~consisting of:~~ a scaffold structure consisting of:

<u>a plurality of horizontal layers of scaffold material, wherein each horizontal layer is sequentially adhered to the adjacent layer,</u>

<u>wherein each horizontal layer comprises a plurality of raster roads of melt extrusion filament material selected from polycaprolactone (PCL), a polycaprolactone/hydroxyapatite (PCL/HA) composite, or a polycaprolactone/tricalcium phosphate (PCL/TCP) composite with a fill gap between each raster road, thereby providing a horizontal channel between each raster road,</u>

<u>wherein the ratio of the raster road width to the channel width is constant in each layer,</u>

<u>and wherein the each sequential layer is deposited at different raster angles in the z-axis view,</u>

<u>thereby providing a scaffold structure having interconnected channels, said scaffold structure is a patient-specific scaffold for use in tissue engineering</u> ~~having a scaffold structure having a~~

~~porosity of 30%-80% and formed of a plurality of horizontal layers of melt extrusion filament materials formed at a liquefier temperature of 120° C ± 10° C and an envelope temperature of 25° C ± 2° C;~~

~~vertical walls forming each of said plurality of horizontal layers of material, said walls of each layer of said plurality horizontal layers each having a height, each being horizontally separated from one another, and defining an orientation;~~

~~adjacent pairs of said vertical walls of each of said plurality of horizontal layers of material forming channels therebetween, said channels having a depth and a width created by said height of said walls and said horizontal separation of said adjacent pairs of said vertical walls, respectively;~~

~~adjacent layers in said plurality of horizontal layers of material being in different orientations to one another wherein said orientation defined by adjacent ones of said layers of said walls of said plurality of horizontal layers differ from one another, said different orientations providing a group of cross-points to allow adhesion between said adjacent layers and providing interconnectivity between said channels throughout said scaffold structure;~~

~~said scaffold horizontal layers of melt extrusion materials comprising at least one of PCL and PCL/HA, formed with an FDM 3D rapid prototyping system, the FDM system operating in X, Y, and Z axes;~~

~~wherein the orientations of said walls are in lay-down patterns of 0°/60°/120° forming horizontally disposed triangular pores having a size in the range of 200-780μm.~~

66.   (Canceled)

67.   (New) The apparatus of Claim 40, wherein the sequential layers are deposited at raster angles of 0°/60°/120° thereby forming a triangular pattern of scaffold material in the z-axis view.

68.   (New) The apparatus of Claim 40, wherein the sequential layers are deposited at raster angles of 0°/72°/144°/36°/108° thereby forming a polygonal pattern of scaffold material in the z-axis view.

69.   (New) The apparatus of Claim 40, wherein the patient-specific scaffold is 30% to 80% porous.

70.   (New) The apparatus of Claim 40, wherein the patient-specific scaffold has a compression stiffness under ambient air conditions of 4 MPa to 77 MPa.

71.   (New) The apparatus of Claim 40, wherein the channel width is 250μm to 780 μm.

72.   (New) The apparatus of Claim 65, wherein the sequential layers are deposited at raster angles of 0°/60°/120° thereby forming a triangular pattern of scaffold material in the z-axis view.

73.   (New) The apparatus of Claim 65, wherein the sequential layers are deposited at raster angles of 0°/72°/144°/36°/108° thereby forming a polygonal pattern of scaffold material in the z-axis view.

74.   (New) The apparatus of Claim 65, wherein the patient-specific scaffold is 30% to 80% porous.

75.   (New) The apparatus of Claim 65, wherein the patient-specific scaffold has a compression stiffness under ambient air conditions of 4 MPa to 77 MPa.

76.   (New) The apparatus of Claim 65, wherein the channel width is 250μm to 780 μm.

77.   (New) A patient-specific apparatus for use in tissue engineering, wherein said apparatus comprises a scaffold structure corresponding to a digital model of the patient-specific apparatus, said scaffold structure comprising:

        a plurality of horizontal layers of scaffold material, wherein each horizontal layer is sequentially adhered to the adjacent layer,

        wherein each horizontal layer comprises a plurality of raster roads of melt extrusion filament material with a fill gap between each raster road, thereby providing a horizontal channel between each raster road,

wherein the ratio of the raster road width to the channel width is constant in each layer,

and wherein the each sequential layer is deposited at raster angles of 0°/60°/120° to produce a triangular pattern of scaffold material in the z-axis view or 0°/72°/144°/36°/108° to produce a polygonal pattern of scaffold material in the z-axis view,

thereby providing a scaffold structure having interconnected channels, said scaffold structure is a patient-specific scaffold for use in tissue engineering.

78. (New) The apparatus of Claim 77, wherein the melt extrusion filament material is selected from polycaprolactone (PCL), a polycaprolactone/hydroxyapatite (PCL/HA) composite, or a polycaprolactone/tricalcium phosphate (PCL/TCP) composite.

79. (New) The apparatus of Claim 77, wherein the patient-specific scaffold is 30% to 80% porous.

80. (New) The apparatus of Claim 77, wherein the patient-specific scaffold has a compression stiffness under ambient air conditions of 4 MPa to 77 MPa.

81. (New) The apparatus of Claim 77, wherein the channel width is 250μm to 780 μm.

82. (New) A patient-specific apparatus for use in tissue engineering, wherein said apparatus consists of a scaffold structure consisting of:

a plurality of horizontal layers of scaffold material, wherein each horizontal layer is sequentially adhered to the adjacent layer,

wherein each horizontal layer comprises a plurality of raster roads of melt extrusion filament material with a fill gap between each raster road, thereby providing a horizontal channel between each raster road,

wherein the ratio of the raster road width to the channel width is constant in each layer,

and wherein the each sequential layer is deposited at raster angles of 0°/60°/120° to produce a triangular pattern of scaffold material in the z-axis view or

0°/72°/144°/36°/108° to produce a polygonal pattern of scaffold material in the z-axis view,

thereby providing a scaffold structure having interconnected channels, said scaffold structure is a patient-specific scaffold for use in tissue engineering.

83. (New) The apparatus of Claim 82, wherein the melt extrusion filament material is selected from polycaprolactone (PCL), a polycaprolactone/hydroxyapatite (PCL/HA) composite, or a polycaprolactone/tricalcium phosphate (PCL/TCP) composite.

84. (New) The apparatus of Claim 82, wherein the patient-specific scaffold is 30% to 80% porous.

85. (New) The apparatus of Claim 82, wherein the patient-specific scaffold has a compression stiffness under ambient air conditions of 4 MPa to 77 MPa.

86. (New) The apparatus of Claim 82, wherein the channel width is 250μm to 780 μm.

87. (New) An apparatus for use in tissue engineering, said apparatus comprising a patient-specific scaffold structure having interconnected channels, said scaffold structure prepared by a method of fused deposition modeling (FDM) based on a digital model of the patient-specific scaffold, said method comprising:

forming a plurality of horizontal layers of a scaffold based on the digital model of a patient-specific scaffold by depositing sequential layers of scaffold material under conditions sufficient to adhere each sequential layer to the adjacent layer,

wherein each layer is formed by depositing raster roads of melt extrusion filament material selected from polycaprolactone (PCL), a polycaprolactone/hydroxyapatite (PCL/HA) composite, or a polycaprolactone/tricalcium phosphate (PCL/TCP) composite,

wherein a fill gap between each raster road provides a horizontal channel, wherein the ratio of the raster road width to the channel width is constant in each layer,

and wherein the each sequential layer is deposited at a different raster angle, thereby producing a patient-specific scaffold having interconnected channels.

88.   (New) An apparatus for use in tissue engineering, said apparatus comprising a patient-specific scaffold structure having interconnected channels, said scaffold structure prepared by a method of fused deposition modeling (FDM) based on a digital model of the patient-specific scaffold, said method comprising:

forming a plurality of horizontal layers of a scaffold based on the digital model of a patient-specific scaffold by depositing sequential layers of scaffold material under conditions sufficient to adhere each sequential layer to the adjacent layer,

wherein each layer is formed by depositing raster roads of melt extrusion filament material,

wherein a fill gap between each raster road provides a horizontal channel,

wherein the ratio of the raster road width to the channel width is constant in each layer,

and wherein the each sequential layer is deposited at raster angles of 0°/60°/120° to produce a triangular pattern of scaffold material in the z-axis view or 0°/72°/144°/36°/108° to produce a polygonal pattern of scaffold material in the z-axis view,

thereby producing a patient-specific scaffold having interconnected channels.